limit is exceeded. The proposed change will revise Specification 3.9(a) and the associated ACTION statement to incorporate a revised value for MTC of -2.88×10^{-4} Δk/k/°F.

Technical Specification 3.9(b) establishes surveillance requirements to ensure that the MTC limit in Specification 3.9(a) is not exceeded. This includes a comparison of the measured MTC value with a predetermined MTC value within 7 effective full power days of reaching an equilibrium boron concentration of 300 ppm. With regard to calculating the predetermined MTC value, the current Specification 3.9(b) states: "The predetermined calculated MTC value (at RATED THERMAL POWER conditions with all rods withdrawn) is determined as follows: -3.1×10^{-4} Δk/k/°F MTC at a nominal core inlet coolant temperature of 551.5°F, and MTC increasing linearly with decreasing inlet coolant temperature to -2.5×10^{-4} Δk/k/°F at a nominal core inlet coolant temperature of 528.0°F." The proposed change will revise this statement to read as follows: "The predetermined calculated MTC value (at RATED THERMAL POWER conditions with all rods withdrawn) is -2.47×10^{-4} Δk/k/°F at a nominal core average coolant temperature of 551.5°F." Consistent with this change, the first sentence in the ACTION statement will be revised to delete the word "applicable."

The second paragraph of the existing BASIS for Specification 3.9 currently refers to "Figure 14 of Amendment 18" for the limiting MTC used in the MSLB accident analysis. This will be revised to reflect the most current MSLB analysis, included as new Reference (1) in Specification 3.9. Accordingly, references to "Figure 14 of Amendment 18" in the second paragraph of the BASIS will be replaced by "Figure A2.1 of Reference (1)." Revision to this paragraph will also include correction of a punctuation error in the second sentence of the paragraph. After the correction, this sentence will read: "In order to ensure that the safety analysis remains valid, the reactor should not be operated with an MTC more negative than the limit implied by Figure A2.1 of Reference (1)."

The BASIS of Specification 3.9 describes a method for calculating the most negative MTC equivalent to the most positive moderator density coefficient (MDC). The calculation includes transformation of the MDC "into the limiting MTC value -4.0×10^{-4} Δk/k/°F." The proposed change will revise this MTC value to -3.18×10^{-4} Δk/k/°F and improve the sentence by adding the word "of" in front of the MTC value. The BASIS also states: "In order to provide a margin of safety, the reactor should not be operated with an MTC more negative than -3.8×10^{-4} Δk/k/°F." This statement will be revised as follows: "In order to provide a margin of safety with regard to uncertainty in analysis and measurement, the reactor should not be operated with an MTC more negative than -2.88×10^{-4} Δk/k/°F."

The final paragraph under the BASIS discusses measurement of the MTC "at" the end of the fuel cycle to confirm that the MTC remains within its limits. This will be changed to state that it is adequate to perform measurement of the MTC "near" the end of fuel cycle. The MTC measurement at 300 ppm does not occur at the end of the fuel cycle, but at approximately 76% through the fuel cycle. Therefore, it is more appropriate to use the term "near" than the term "at" in discussing the time period when it is necessary to confirm that the MTC remains within its limits.

Technical Specification 3.9 currently contains a list of three references which are not specifically referenced in the text and are obsolete. These references will be replaced from the "References" section by a single reference containing the current MTC information.

CHANGES TO SPECIFICATION 3.3.3

Technical Specification 3.3.3(b) establishes 1,500 ppm as the minimum boron concentration limit for the SI lines to be operable. ACTION B delineates required actions to be taken when the SI lines are inoperable due to boron concentration of less then 1,500 ppm. The proposed change will revise these two statements to reflect the increase in the minimum boron concentration limit from 1,500 ppm to 3,000 ppm. ACTION B currently requires actions when "one or both" SI lines are inoperable. This will be changed to reflect the existence of more than two SI lines at SONGS 1.

Technical Specification 3.3.3(b) also establishes 4,300 ppm as the maximum boron concentration limits for the SI lines to be operable. ACTION B requires that actions be taken with "SI lines inoperable due to boron concentration of less than 1500 ppm." This statement will be clarified to indicate that the SI lines will be considered inoperable if the boron concentration is outside both the minimum and the maximum limits required by Specification 3.3.3(b). After all the corrections are implemented, ACTION B will state: "With one or more SI lines inoperable in accordance with Specification b, restore the SI lines to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and COLD SHUTDOWN within the next 30 hours."

The BASIS for Specification 3.3.3 will also be revised to reflect the new minimum boron concentration limit of 3,000 ppm in the SI lines. Other changes to the BASIS will include replacement of existing Reference No. 2 with a more current document that contains results of the MSLB analysis with revised MDC. The existing Reference No. 4 is also no longer current and is superseded by the new Reference No. 2. Therefore, Reference No. 4 will be deleted from the BASIS and the Reference sections of Technical Specification 3.3.3.

CHANGES TO SPECIFICATION 3.5.2

Technical Specification 3.5.2 includes insertion limit requirements for control rods in order to ensure core subcriticality after a reactor trip. With respect to shutdown capability, item 2 of the Basis for Technical Specification 3.5.2 states that a minimum shutdown capability of 1.9% $\Delta\rho$ is required at EOL. The proposed change will revise this value to 2.05% $\Delta\rho$. A reference document will be added to the list in the "Reference" Section of Specification 3.5.2.

DISCUSSION

BACKGROUND

During the recent Updated Final Safety Analysis Report Chapter 15 reanalysis for SONGS 1, SCE discovered an inconsistency between the basis for the end-of-cycle MTC limit stated in Technical Specification 3.9 and the MSLB accident reanalysis performed by Westinghouse. Westinghouse used the parameter Moderator Density Coefficient (MDC) in the MSLB reanalysis. The value used for the MDC was less conservative than the value used in previous cycle analyses. The MTC and the MDC are directly related, and therefore, use of the less conservative MDC rendered the Technical Specification MTC nonconservative for the MSLB reanalysis.

Technical Specification 3.9 establishes the most negative MTC limit (-3.8×10^{-4} Δk/k/°F) for all rods withdrawn, end-of-cycle life (EOL), and rated thermal power conditions. The basis for this specification states that the required MTC value bounds the MSLB event. However, this is not consistent with the assumptions used in the Westinghouse reanalysis of SONGS 1 MSLB event for Cycle 11. Using their standard analysis methodology for evaluating MSLB events for Cycle 11, Westinghouse used a value for MTC that was less limiting than the Technical Specification limit. According to Westinghouse, the MTC Technical Specification is not intended to bound the MSLB.

Subsequent to the discovery of the inconsistency, Westinghouse assured SCE that the current modeling of SONGS 1 MSLB event is conservative. However, Westinghouse maintains that the MTC Technical Specification is not intended to provide protection for the MSLB event, and therefore, has recommended that references to the MSLB event be deleted from the basis of Technical Specification 3.9, consistent with their MSLB analysis methodology and Standard Technical Specifications.

SCE considered all available options to resolve the inconsistency satisfactorily. This included revising only the basis for the MTC Technical Specification in accordance with Westinghouse recommendations and consistent with other Westinghouse plants and Standard Technical Specifications. After evaluating the available options, SCE has chosen to pursue a conservative position that the MTC Technical Specification should indeed bound all accidents including the MSLB. The NRC has concurred with SCE's position, and has requested SCE to initiate actions to revise the Technical Specifications as appropriate.

WESTINGHOUSE METHODOLOGY

In analyzing the MSLB events, Westinghouse applies a process which directly confirms the conservatism contained in the MSLB reactivity assumptions on a cycle-by-cycle reload design basis. Consequently, the standard Westinghouse Technical Specification basis for MTC intentionally does not cite any particular accident analysis, and refers only to the FSAR safety analyses in general terms. Although the MSLB event is not specifically excluded from their standard basis for MTC, Westinghouse maintains that the MTC Technical

Specification is not intended to provide protection for this event.

The FSAR licensing basis events that do assume a maximum moderator reactivity feedback condition are evaluated by Westinghouse separately from MSLB events. These include events such as: Loss of Load, Turbine Trip, Feedwater Increase, Feedline break, and Control Bank Withdrawal at Power. According to Westinghouse, analyses of these events provide the basis for Technical Specification 3.9 on MTC, and therefore, the MSLB event should not be specifically cited in the basis of the SONGS 1 Technical Specifications. Information regarding the basis for the MTC Technical Specification as it relates to SONGS 1 safety analysis is contained in Reference 1.

REVISED LIMITS FOR MTC

New MSLB Core Response and Mass and Energy Release calculations have been performed with revised MDCs equivalent to the new MTC values required to bound the MSLB event. These calculations are based on the following assumptions:

- Revised MDCs for steam line break conditions which are equivalent to an EOL Hot Full Power MTC of -2.88×10^{-4} $\Delta k/k/°F$ (including allowance for analysis and measurement uncertainties);

- Boron concentration in the safety injection lines remains at or above a minimum value of 3,000 ppm; and

- The Hot Zero Power EOL shutdown margin is maintained at or above a minimum value of 2.05% $\Delta\rho$.

The results of the revised MSLB Core Response calculations (Reference 2) demonstrate that Departure from Nucleate Boiling (DNB) will not occur following a credible or hypothetical steam line break, and that all applicable Standard Review Plan acceptance criteria for such an accident are met. The existing design basis therefore remains valid.

The results of the revised MSLB Mass & Energy Release calculations indicate that the integrated energy release to the containment is less than that used in previous calculations of record, and hence the peak containment pressure is bounded by previous results.

The proposed change to Technical Specification 3.9(b) has no adverse effect on the ability to monitor MTC at SONGS 1. Comparison of the measured MTC with the predetermined calculated value will be on the basis of the core average coolant temperature instead of the core inlet coolant temperature. This is necessary since the plant is operating under an RCS temperature program based on core average coolant temperature. The core average coolant temperature of 551.5°F corresponds to a core inlet coolant temperature of 528°F. Specifying only one value for the predetermined calculated value is sufficient to provide the comparison criteria since the current safety analysis for SONGS 1 only allows operation at the reduced core average coolant temperature condition, which is equivalent to the core average coolant temperature of 551.5°F.

REVISED LIMITS FOR BORON CONCENTRATION AND SHUTDOWN MARGIN

Any penalty associated with the use of new values for MDC (equivalent to the revised MTC) in the revised calculations will be offset by an increase in the limits for safety injection line minimum boron concentration and shutdown margin. These changes will also provide margin in the MTC Technical Specification for MSLB that is needed to complete Cycle 11 operation.

The current Technical Specification 3.3.3 specifies a minimum boron concentration limit of 1,500 ppm in the safety injection lines. This value will be increased to 3,000 ppm by the proposed change.

Technical Specification 3.5.2 includes insertion limit requirements for control rods in order to ensure core subcriticality after a reactor trip. With respect to shutdown capability, item 2 of the Basis for Technical Specification 3.5.2 states that a minimum shutdown capability of 1.9% $\Delta\rho$ is required at EOL. This value will be increased to 2.05% $\Delta\rho$ by the proposed change. The increased shutdown margin is well within the existing available margin based on the rod insertion limits included in the current Technical Specifications. Therefore, the existing rod insertion limits remain valid.

The proposed change in the SI line minimum boron concentration limit and the shutdown margin will result in less adverse consequences from an MSLB. These parameters only affect the assumptions for the MSLB accident analysis, and have no adverse effect on analyses of any other accidents.

REFERENCES

1. Letter, S. A. Pujadas, Westinghouse to T. Yackle, SCE, "MTC - Technical Specification," SCE-91-611, November 6, 1991.

2. Letter, S. A. Pujadas, Westinghouse to T. Yackle, SCE, "MSLB Analysis for SONGS-1 with Revised MDC," SCE-92-518, April 6, 1992.

SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS

In accordance with 10CFR50.91(a)(1), the following analysis is provided to demonstrate that the proposed change does not represent a significant hazard consideration. According to 10CFR50.92(c), the proposed change discussed above is deemed to involve a significant hazards consideration if there is a positive finding in any one of the following areas:

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change results in the following three major changes to SONGS 1 Technical Specifications: (1) revise the most negative MTC limit in Specification 3.9 from -3.8 x 10^{-4} $\Delta k/k/°F$ to -2.88 x 10^{-4} $\Delta k/k/°F$; (2) increase the required minimum safety injection (SI) line boron concentration limit in Specification 3.3.3 from 1,500 ppm to 3,000 ppm; and (3) increase the required minimum EOL shutdown capability in the Basis of Specification 3.5.2 from 1.9% $\Delta\rho$ to 2.05% $\Delta\rho$. The proposed change represents increased Technical Specification requirements for the three parameters to ensure that the MTC Technical Specification bounds all accidents.

Results of calculations using the new limits indicate that Departure from Nucleate Boiling (DNB) will not occur following an MSLB; that containment response will be acceptable; and that all applicable acceptance criteria will be met. There is no impact on the results of other existing safety analyses due to the proposed change. Consistent with the existing basis for the MTC Technical Specification, the revision to the MTC value will ensure that all accidents, including the MSLB accident, are bounded by the Technical Specification. The probability of any accident previously evaluated will not be impacted by the proposed change.

The proposed change does not reduce the plant's capability to respond to accident conditions. The revised MSLB Mass & Energy Release calculations indicate that the integrated energy release to containment is less than previous values. The change in shutdown margin and the SI line boron concentration will result in less adverse consequences from an MSLB accident, and no impact on other accident analyses. The consequences of other accidents previously evaluated will not be affected by the proposed change, and will remain bounded by previous safety analyses.

Therefore, operation of the facility in accordance with this proposed change does not involve a significant increase in the probability or consequences of any accident previously evaluated.

2. Will operation of the facility in accordance with these proposed changes create the possibility of a new or different kind of accident from any previously evaluated?

   Response: No.

   The proposed change represents increased Technical Specification requirements for MTC, SI line minimum boron concentration, and shutdown margin. The proposed change will place more restrictive limits on these parameters, and will ensure that all accidents, including the MSLB, are bounded by the MTC Technical Specification. There is no adverse impact on the plant's systems to perform their intended safety functions. The existing design and licensing basis remain valid. The proposed change does not introduce any new factors that can create accidents. Therefore, operation of the facility in accordance with the proposed changes does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Will operation of the facility in accordance with the proposed changes involve a significant reduction in the margin of safety?

   Response: No.

   The proposed change establishes more restrictive limits for MTC, SI line minimum boron concentration, and the shutdown limit. The new limits are more conservative than the existing limits, and will ensure that all accidents, including the MSLB accident, are bounded by the Technical Specification. The proposed change will also ensure that the existing basis for the MTC Technical Specification remains valid. The existing design basis and safety analyses will remain valid. There will be no impact on the safety margin in existing analyses. Therefore, operation of the facility in accordance with the proposed change will not involve a reduction in the margin of safety.

SAFETY AND SIGNIFICANT HAZARDS DETERMINATION

Based on the above safety analysis, it is concluded that: 1) the proposed change does not provide significant hazards considerations as defined by 10CFR50.92; 2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and 3) the proposed change will not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Final Environmental Statement.

ATTACHMENT 1

EXISTING TECHNICAL SPECIFICATIONS

3.9 MODERATOR TEMPERATURE COEFFICIENT (MTC)

APPLICABILITY: Applies to negative moderator temperature coefficient (MTC) during core operations whenever the nominal reactor coolant inlet temperature is greater than or equal to 528°F.

OBJECTIVE: To establish negative MTC limits for the core.

SPECIFICATION:

a. The MTC shall be less negative than -3.8×10^{-4} $\Delta k/k/°F$ for all rods withdrawn, end of cycle life (EOL) and the RATED THERMAL POWER condition.

b. In order to assure that the above negative MTC limit is not exceeded, the MTC shall be measured at any THERMAL POWER and compared to the predetermined, calculated negative MTC within 7 effective full power days (EFPD) of reaching an equilibrium boron concentration of 300 ppm. The predetermined calculated MTC value (at RATED THERMAL POWER conditions with all rods withdrawn) is determined as follows:

   -3.1×10^{-4} $\Delta k/k/°F$ MTC at a nominal core inlet coolant temperature of 551.5°F, and MTC increasing linearly with decreasing inlet coolant temperature to -2.5×10^{-4} $\Delta k/k/°F$ at a nominal core inlet coolant temperature of 528.0°F.

ACTION: In the event this comparison indicates the MTC is more negative than the applicable value given above, the MTC shall be remeasured, and compared to the EOL MTC limit of -3.8×10^{-4} $\Delta k/k/°F$ at least once per 14 EFPD during the remainder of the cycle. If the measured MTC is more negative than the -3.8×10^{-4} $\Delta k/k/°F$ limit any time during the remainder of the cycle, the reactor shall be in HOT SHUTDOWN within 12 hours after exceeding the negative MTC limit.

BASIS: The limitations on moderator temperature coefficient (MTC) are provided to ensure that the value of this coefficient remains within the limiting condition assumed in the San Onofre Unit 1 accident and transient analyses.

The limiting MTC used in the steam line break accident analysis is given as a function of k_{eff} and average moderator temperature in Figure 14 of Amendment 18 to the FSAR. In order to ensure that the safety analysis remains valid. The reactor should not be operated with an MTC more negative than the limit implied by Figure 14 of Amendment 18.

The MTC values of this specification are applicable to a specific set of plant conditions; accordingly, verification of MTC values at conditions other than those explicitly stated will require extrapolation to those conditions in order to permit an accurate comparison.

The most negative MTC value equivalent to the most positive moderator density coefficient (MDC), was obtained by incrementally correcting the MDC used in the San Onofre Unit 1 analyses to nominal operating conditions. These corrections involved subtracting the incremental change in the MDC associated with a core condition of all rods inserted (most positive MDC) to an all rods withdrawn condition, and a conversion for the rate of change of moderator density with temperature at RATED THERMAL POWER conditions. This value of the MDC was then transformed into the limiting MTC value -4.0×10^{-4} $\Delta k/k/°F$. The MTC predetermined calculated value for surveillance purposes represent conservative values (with corrections for burnup and soluble boron) at a core condition of 300 ppm equilibrium boron concentration and are obtained by making these corrections to the limiting MTC value of -4.0×10^{-4} $\Delta k/k/°F$. In order to provide a margin of safety, the reactor should not be operated with an MTC more negative than -3.8×10^{-4} $\Delta k/k/°F$.

The measurement of the MTC at the end of the fuel cycle is adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in boron concentration associated with fuel burnup.

<u>References</u>:

(1) Final Engineering Report and Safety Analysis, Paragraph 3.4

(2) Supplement No. 1 to Final Engineering Report and Safety Analysis Section 5, Question 8 and 9

(3) Final Engineering Report and Safety Analysis, Paragraph 3.9

3.3.3 MINIMUM BORON CONCENTRATION IN THE REFUELING WATER STORAGE TANK (RWST) AND SAFETY INJECTION (SI) LINES AND MINIMUM RWST WATER VOLUME

APPLICABILITY: MODES 1, 2, 3 and 4; or as described in Specification 3.2.

OBJECTIVE: To ensure immediate availability of borated water from the RWST for safety injection, containment spray or emergency boration.

SPECIFICATION:

a. The RWST shall be OPERABLE with a level of at least plant elevation 50 feet of water having a boron concentration of not less than 3750 ppm and not greater than 4300 ppm.

b. The safety injection (SI) lines from the RWST to MOV 850 A, B and C, with the exception of lines common to the feedwater system, shall be OPERABLE with a boron concentration of not less than 1500 ppm and not greater than 4300 ppm.

ACTION:

A. With the refueling water storage tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

B. With one or both SI lines inoperable due to boron concentration of less than 1500 ppm, restore the SI lines to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and COLD SHUTDOWN within the next 30 hours.

BASIS: The refueling water storage tank serves three purposes; namely:

(1) As a reservoir of borated water for accident mitigation purposes,

(2) As a reservoir of borated water for flooding the refueling cavity during refueling.

(3) As a deluge for fires in containment.

Approximately 220,000 gallons of borated water is required to provide adequate post-accident core cooling and containment spray to maintain calculated post-accident doses below the limits of 10 CFR 100(1). The refueling water storage tank filled to elevation 50 feet represents in excess of 240,000 gallons.

A boron concentration of 3750 ppm in the RWST and 1500 ppm in the SI lines is required to meet the requirements of postulated steam line break.(2)(4) A maximum boron concentration of 4300 ppm ensures that the post-accident containment sump water is maintained at a pH between 7.0 and 7.5(3).

The refueling tank capacity of 240,000 gallons is based on refueling volume requirements and includes an allowance for water not useable because of tank discharge line location.

Sustained temperatures below 32•F do not occur at San Onofre. At 32•F, boric acid is soluble up to approximately 4650 ppm boron. Therefore, no special provisions for temperature control to avoid either freezing or boron precipitation are necessary.

<u>References</u>:

(1) Enclosure 1 "Post-Accident Pressure Reanalysis, San Onofre Unit 1" to letter dated January 19, 1977 in Docket No. 50-206.

(2) "Steam Line Break Accident Reanalysis, San Onofre Nuclear Generating Station, Unit 1, October 1976" submitted by letter dated December 30, 1976 in Docket No. 50-206.

(3) Additional information, San Onofre, Unit 1 submitted by letter dated March 24, 1977 in Docket No. 50-206.

(4) Reload Safety Evaluation, San Onofre Nuclear Generating Station, Unit 1, Cycle 10, edited by J. Skaritka, Revision 1, Westinghouse, March 1989

3.5.2 CONTROL ROD INSERTION LIMITS

APPLICABILITY: MODES 1 and 2

OBJECTIVE: This specification defines the insertion limits for the control rods in order to ensure (1) an acceptable core power distribution during power operation, (2) a limit on potential reactivity insertions for a hypothetical control rod ejection, and (3) core subcriticality after a reactor trip.

SPECIFICATION:

A. Except during low power physics tests or surveillance testing pursuant to Specification 4.1.1.G, the Shutdown Groups and Control Group 1 shall be fully withdrawn, and the position of Control Group 2 shall be at or above the 21-step uncertainty limit shown in Figure 3.5.2.1.

B. The energy weighted average of the positions of Control Group 2 shall be at least 90% (i.e. > Step 288) withdrawn after the first 20% burnup of a core cycle. The average shall be computed at least twice every month and shall consist of all Control Group 2 positions during the core cycle.

ACTION:

A. With the control groups inserted beyond the above insertion limits either:

1. Restore the control groups to within the limits within 2 hours, or

2. Reduce THERMAL POWER within 2 hours to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the group position using the above figure, or

3. Be in at least HOT STANDBY within 6 hours.

B. With a single dropped rod from a shutdown group or control group, the provisions of Action A are not applicable, and retrieval shall be performed without increasing THERMAL POWER beyond the THERMAL POWER level prior to dropping the rod. An evaluation of the effect of the dropped rod shall be made to establish permissible THERMAL POWER levels for continued operation. If retrieval is not successful within 3 hours from the time the rod was dropped, appropriate action, as determined from the evaluation, shall be taken. In no case shall operation longer than 3 hours be permitted if the dropped rod is worth more than 0.4% Δ k/k.

BASIS: During STARTUP and POWER OPERATION, the shutdown groups and control group 1 are fully withdrawn and control of the reactor is maintained by control group 2. The control group insertion limits are set in consideration of maximum specific shutdown capability, and the rod ejection accident. The considerations associated with each of these quantities are as follows:

1. The initial design maximum value of specific power is 15 kW/ft. The values of $F^N_{\Delta H}$ and F_Q total associated with this specific power are 1.75 and 3.23, respectively.

   A more restrictive limit on the design value of specific power, $F^N_{\Delta H}$ and F_Q is applied to operation in accordance with the current safety analysis including fuel densification and ECCS performance. The values of the specific power, $F^N_{\Delta H}$ and F_Q are 13.2 kW/ft, 1.57 and 2.78, respectively.(8) At partial power, the $F^N_{\Delta H}$ maximum values (limits) increase according to the following equation, $F^N_{\Delta H}(P) = 1.57\,[1 + 0.2\,(1-P)]$, where P is the fraction of RATED THERMAL POWER. The control group insertion limits in conjunction with Specification B prevent exceeding these values even assuming the most adverse Xe distribution.

2. The minimum shutdown capability required is 1.25% $\Delta\rho$ at BOL, 1.9% $\Delta\rho$ at EOL and defined linearly between these values for intermediate cycle lifetimes. The rod insertion limits ensure that the available SHUTDOWN MARGIN is greater than the above values.

3. The worst case ejected rod accident (9) covering HFP-BOL, HZP-BOL, HFP-EOL shall satisfy the following accident safety criteria:

   a) Average fuel pellet enthalpy at the hot spot below 225 cal/gm for nonirradiated fuel and 220 cal/gm for irradiated fuel.

   b) Fuel melting is limited to less than the innermost 10% of the fuel pellet at the hot spot.

   Low power physics tests are conducted approximately one to four times during the core cycle at or below 10% RATED THERMAL POWER. During such tests, rod configurations different from those specified in Figure 3.5.2.1 may be employed.

   It is understood that other rod configurations may be used during physics tests. Such configurations are permissible based on the low probability of occurrence of steam line break or rod ejection during such rod configurations.

Operation of the reactor during cycle stretch out is conservative relative to the safety considerations of the control rod insertion limits, since the positioning of the rods during stretch out results in an increasing net available SHUTDOWN MARGIN.

Compliance with Specification B prevents unfavorable axial power distributions due to operation for long intervals at deep control rod insertions.

The presence of a dropped rod leads to abnormal power distribution in the core. The location of the rod and its worth in reactivity determines its effect on the temperatures of nearby fuel. Under certain conditions, continued operation could result in fuel damage, and it is the intent of ACTION B to avoid such damage.

<u>References</u>:

(1) Final Engineering Report and Safety Analysis, revised July 28, 1970.

(2) Amendment No. 18 to Docket No. 50-206.

(3) Amendment No. 22 to Docket No. 50-206.

(4) Amendment No. 23 to Docket No. 90-206.

(5) Description and Safety Analysis, Proposed Change No. 7, dated October 22, 1971.

(6) Description and Safety Analysis Including Fuel Densification, San Onofre Nuclear Generating Station, Unit 1, Cycle 4, WCAP 8131, May, 1973.

(7) Description and Safety Analysis Including Fuel Densification, San Onofre Nuclear Generating Station, Unit 1, Cycle 5, January, 1975, Westinghouse Non-Proprietary Class 3.

(8) Reload Safety Evaluation, San Onofre Nuclear Generating Station, Unit 1, Cycle 10, edited by J. Skaritka, Revision 1, Westinghouse, March, 1989.

(9) An Evaluation of the Rod Ejection Accident in Westinghouse Pressurized Water Reactors Using Spatial Kinetics Methods, WCAP-7588, Revision 1-A, January, 1975.

CONTROL GROUP INSERTION LIMITS

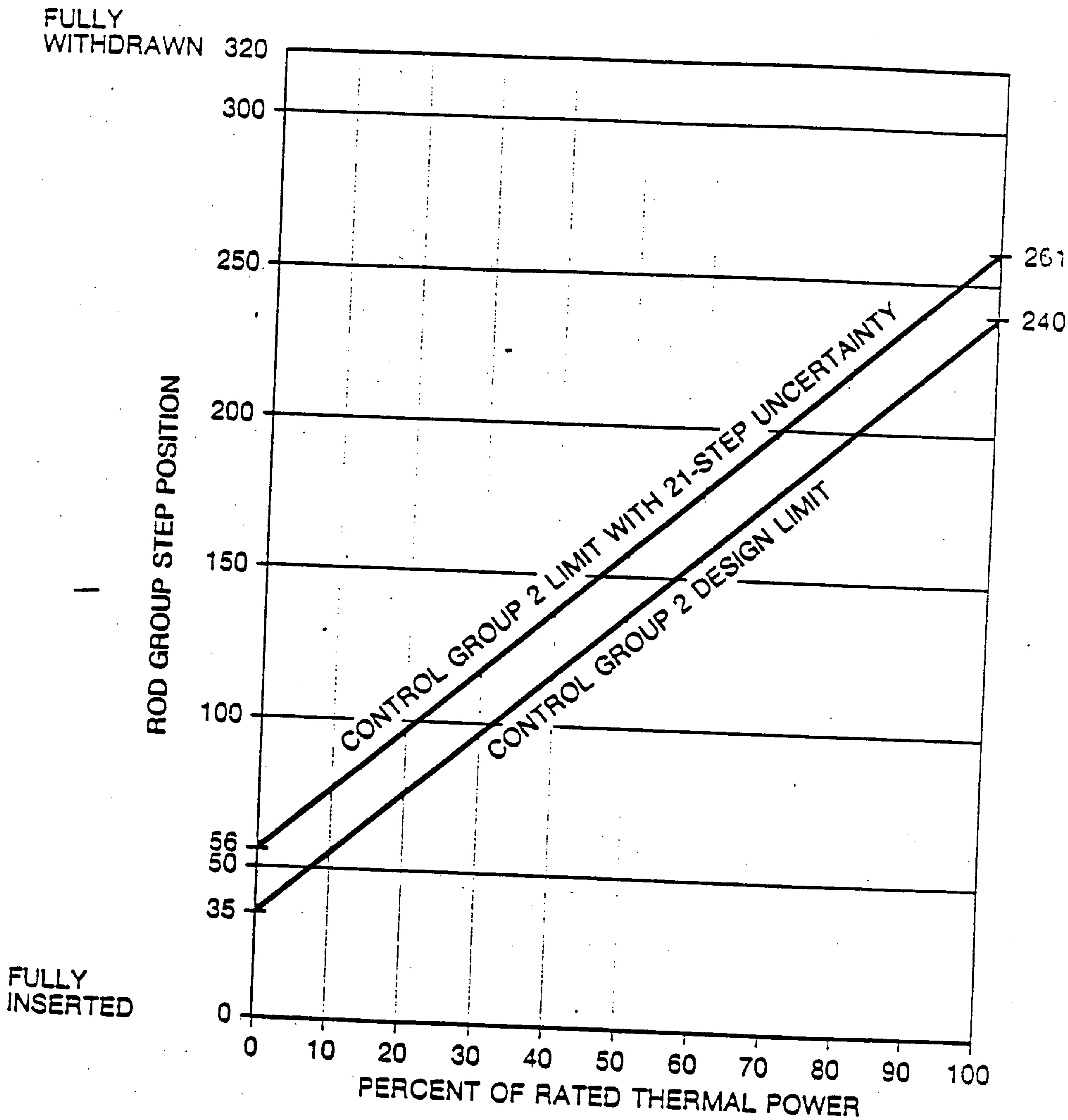

FIGURE 3.5.2.1

ATTACHMENT 2

PROPOSED TECHNICAL SPECIFICATIONS

3.9 MODERATOR TEMPERATURE COEFFICIENT (MTC)

APPLICABILITY: Applies to negative moderator temperature coefficient (MTC) during core operations whenever the nominal reactor coolant inlet temperature is greater than or equal to 528°F.

OBJECTIVE: To establish negative MTC limits for the core.

SPECIFICATION:

a. The MTC shall be less negative than - 2.88 x 10^{-4} Δk/k/°F for all rods withdrawn, end of cycle life (EOL) and the RATED THERMAL POWER condition.

b. In order to assure that the above negative MTC limit is not exceeded, the MTC shall be measured at any THERMAL POWER and compared to the predetermined, calculated negative MTC within 7 effective full power days (EFPD) of reaching an equilibrium boron concentration of 300 ppm. The predetermined calculated MTC value (at RATED THERMAL POWER conditions with all rods withdrawn) is -2.47 x 10^{-4} Δk/k/°F MTC at a nominal core average coolant temperature of 551.5°F.

ACTION: In the event this comparison indicates the MTC is more negative than the applicable value given above, the MTC shall be remeasured, and compared to the EOL MTC limit of -2.88 x 10^{-4} Δk/k/°F at least once per 14 EFPD during the remainder of the cycle. If the measured MTC is more negative than the -2.88 x 10^{-4} Δk/k/°F limit any time during the remainder of the cycle, the reactor shall be in HOT SHUTDOWN within 12 hours after exceeding the negative MTC limit.

BASIS: The limitations on moderator temperature coefficient (MTC) are provided to ensure that the value of this coefficient remains within the limiting condition assumed in the San Onofre Unit 1 accident and transient analyses.

The limiting MTC used in the steam line break accident analysis is given as a function of k_{eff} and average moderator temperature in Figure A2.1 of Reference (1). In order to ensure that the safety analysis remains valid, the reactor should not be operated with an MTC more negative than the limit implied by Figure A2.1 of Reference (1).

The MTC values of this specification are applicable to a specific set of plant conditions; accordingly, verification of MTC values at conditions other than those explicitly stated will require extrapolation to those conditions in order to permit an accurate comparison.

The most negative MTC value equivalent to the most positive moderator density coefficient (MDC), was obtained by incrementally correcting the MDC used in the San Onofre Unit 1 analyses to nominal operating conditions. These corrections involved subtracting the incremental change in the MDC associated with a core condition of all rods inserted (most positive MDC) to an all rods withdrawn condition, and a conversion for the rate of change of moderator density with temperature at RATED THERMAL POWER conditions. This value of the MDC was then transformed into the limiting MTC value of -3.18×10^{-4} Δk/k/°F. The MTC predetermined calculated value for surveillance purposes represent conservative values (with corrections for burnup and soluble boron) at a core condition of 300 ppm equilibrium boron concentration and are obtained by making these corrections to the limiting MTC value of -3.18×10^{-4} Δk/k/°F. In order to provide a margin of safety with regard to uncertainty in analysis and measurement, the reactor should not be operated with an MTC more negative than -2.88×10^{-4} Δk/k/°F.

The measurement of the MTC near the end of the fuel cycle is adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in boron concentration associated with fuel burnup.

<u>Reference</u>: (1) Letter, S. A. Pujadas, Westinghouse to T. Yackle, SCE, "MSLB Analysis for SONGS-1 with Revised MDC," SCE-92-518, April 6, 1992.

3.3.3 MINIMUM BORON CONCENTRATION IN THE REFUELING WATER STORAGE TANK (RWST) AND SAFETY INJECTION (SI) LINES AND MINIMUM RWST WATER VOLUME

APPLICABILITY: MODES 1, 2, 3 and 4; or as described in Specification 3.2.

OBJECTIVE: To ensure immediate availability of borated water from the RWST for safety injection, containment spray or emergency boration.

SPECIFICATION:

a. The RWST shall be OPERABLE with a level of at least plant elevation 50 feet of water having a boron concentration of not less than 3750 ppm and not greater than 4300 ppm.

b. The safety injection (SI) lines from the RWST to MOV 850 A, B and C, with the exception of lines common to the feedwater system, shall be OPERABLE with a boron concentration of not less than 3000 ppm and not greater than 4300 ppm.

ACTION:

A. With the refueling water storage tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

B. With one or more SI lines inoperable in accordance with Specification b, restore the SI lines to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and COLD SHUTDOWN within the next 30 hours.

BASIS: The refueling water storage tank serves three purposes; namely:

(1) As a reservoir of borated water for accident mitigation purposes,

(2) As a reservoir of borated water for flooding the refueling cavity during refueling.

(3) As a deluge for fires in containment.

Approximately 220,000 gallons of borated water is required to provide adequate post-accident core cooling and containment spray to maintain calculated post-accident doses below the limits of 10 CFR 100(1). The refueling water storage tank filled to elevation 50 feet represents in excess of 240,000 gallons.

A boron concentration of 3750 ppm in the RWST and 3000 ppm in the SI lines is required to meet the requirements of postulated steam line break.(2) A maximum boron concentration of 4300 ppm ensures that the post-accident containment sump water is maintained at a pH between 7.0 and 7.5(3).

The refueling tank capacity of 240,000 gallons is based on refueling volume requirements and includes an allowance for water not useable because of tank discharge line location.

Sustained temperatures below 32°F do not occur at San Onofre. At 32°F, boric acid is soluble up to approximately 4650 ppm boron. Therefore, no special provisions for temperature control to avoid either freezing or boron precipitation are necessary.

References:

(1) Enclosure 1 "Post-Accident Pressure Reanalysis, San Onofre Unit 1" to letter dated January 19, 1977 in Docket No. 50-206.

(2) Letter, S. A. Pujadas, Westinghouse to T. Yackle, SCE, "MSLB Analysis for SONGS-1 with Revised MDC," SCE-92-518, April 6, 1992.

(3) Additional information, San Onofre, Unit 1 submitted by letter dated March 24, 1977 in Docket No. 50-206.

3.5.2 CONTROL ROD INSERTION LIMITS

APPLICABILITY: MODES 1 and 2

OBJECTIVE: This specification defines the insertion limits for the control rods in order to ensure (1) an acceptable core power distribution during power operation, (2) a limit on potential reactivity insertions for a hypothetical control rod ejection, and (3) core subcriticality after a reactor trip.

SPECIFICATION:

A. Except during low power physics tests or surveillance testing pursuant to Specification 4.1.1.G, the Shutdown Groups and Control Group 1 shall be fully withdrawn, and the position of Control Group 2 shall be at or above the 21-step uncertainty limit shown in Figure 3.5.2.1.

B. The energy weighted average of the positions of Control Group 2 shall be at least 90% (i.e. > Step 288) withdrawn after the first 20% burnup of a core cycle. The average shall be computed at least twice every month and shall consist of all Control Group 2 positions during the core cycle.

ACTION:

A. With the control groups inserted beyond the above insertion limits either:

1. Restore the control groups to within the limits within 2 hours, or

2. Reduce THERMAL POWER within 2 hours to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the group position using the above figure, or

3. Be in at least HOT STANDBY within 6 hours.

B. With a single dropped rod from a shutdown group or control group, the provisions of Action A are not applicable, and retrieval shall be performed without increasing THERMAL POWER beyond the THERMAL POWER level prior to dropping the rod. An evaluation of the effect of the dropped rod shall be made to establish permissible THERMAL POWER levels for continued operation. If retrieval is not successful within 3 hours from the time the rod was dropped, appropriate action, as determined from the evaluation, shall be taken. In no case shall operation longer than 3 hours be permitted if the dropped rod is worth more than 0.4% Δ k/k.

BASIS: During STARTUP and POWER OPERATION, the shutdown groups and control group 1 are fully withdrawn and control of the reactor is maintained by control group 2. The control group insertion limits are set in consideration of maximum specific power, shutdown capability, and the rod ejection accident. The considerations associated with each of these quantities are as follows:

1. The initial design maximum value of specific power is 15 kW/ft. The values of $F^N_{\Delta}H$ and F_Q total associated with this specific power are 1.75 and 3.23, respectively.

   A more restrictive limit on the design value of specific power, $F^N_{\Delta}H$ and F_Q is applied to operation in accordance with the current safety analysis including fuel densification and ECCS performance. The values of the specific power, $F^N_{\Delta}H$ and F_Q are 13.2 kW/ft, 1.57 and 2.78, respectively.(8) At partial power, the $F^N_{\Delta}H$ maximum values (limits) increase according to the following equation, $F^N_{\Delta}H\ (P) = 1.57\ [1 + 0.2\ (1-P)]$, where P is the fraction of RATED THERMAL POWER. The control group insertion limits in conjunction with Specification B prevent exceeding these values even assuming the most adverse Xe distribution.

2. The minimum shutdown capability required is 1.25% Δρ at BOL, 2.05% Δρ at EOL and defined linearly between these values for intermediate cycle lifetimes. The rod insertion limits ensure that the available SHUTDOWN MARGIN is greater than the above values.

3. The worst case ejected rod accident (9) covering HFP-BOL, HZP-BOL, HFP-EOL shall satisfy the following accident safety criteria:

   a) Average fuel pellet enthalpy at the hot spot below 225 cal/gm for nonirradiated fuel and 220 cal/gm for irradiated fuel.

   b) Fuel melting is limited to less than the innermost 10% of the fuel pellet at the hot spot.

   Low power physics tests are conducted approximately one to four times during the core cycle at or below 10% RATED THERMAL POWER. During such tests, rod configurations different from those specified in Figure 3.5.2.1 may be employed.

   It is understood that other rod configurations may be used during physics tests. Such configurations are permissible based on the low probability of occurrence of steam line break or rod ejection during such rod configurations.

Operation of the reactor during cycle stretch out is conservative relative to the safety considerations of the control rod insertion limits, since the positioning of the rods during stretch out results in an increasing net available SHUTDOWN MARGIN.

Compliance with Specification B prevents unfavorable axial power distributions due to operation for long intervals at deep control rod insertions.

The presence of a dropped rod leads to abnormal power distribution in the core. The location of the rod and its worth in reactivity determines its effect on the temperatures of nearby fuel. Under certain conditions, continued operation could result in fuel damage, and it is the intent of ACTION B to avoid such damage.

References:

(1) Final Engineering Report and Safety Analysis, revised July 28, 1970.

(2) Amendment No. 18 to Docket No. 50-206.

(3) Amendment No. 22 to Docket No. 50-206.

(4) Amendment No. 23 to Docket No. 90-206.

(5) Description and Safety Analysis, Proposed Change No. 7, dated October 22, 1971.

(6) Description and Safety Analysis Including Fuel Densification, San Onofre Nuclear Generating Station, Unit 1, Cycle 4, WCAP 8131, May, 1973.

(7) Description and Safety Analysis Including Fuel Densification, San Onofre Nuclear Generating Station, Unit 1, Cycle 5, January, 1975, Westinghouse Non-Proprietary Class 3.

(8) Reload Safety Evaluation, San Onofre Nuclear Generating Station, Unit 1, Cycle 10, edited by J. Skaritka, Revision 1, Westinghouse, March, 1989.

(9) An Evaluation of the Rod Ejection Accident in Westinghouse Pressurized Water Reactors Using Spatial Kinetics Methods, WCAP-7588, Revision 1-A, January, 1975.

(10) Letter, S. A. Pujadas, Westinghouse to T. Yackle, SCE, "MSLB Analysis for SONGS-1 with Revised MDC," SCE-92-518, April 6, 1992.

CONTROL GROUP INSERTION LIMITS

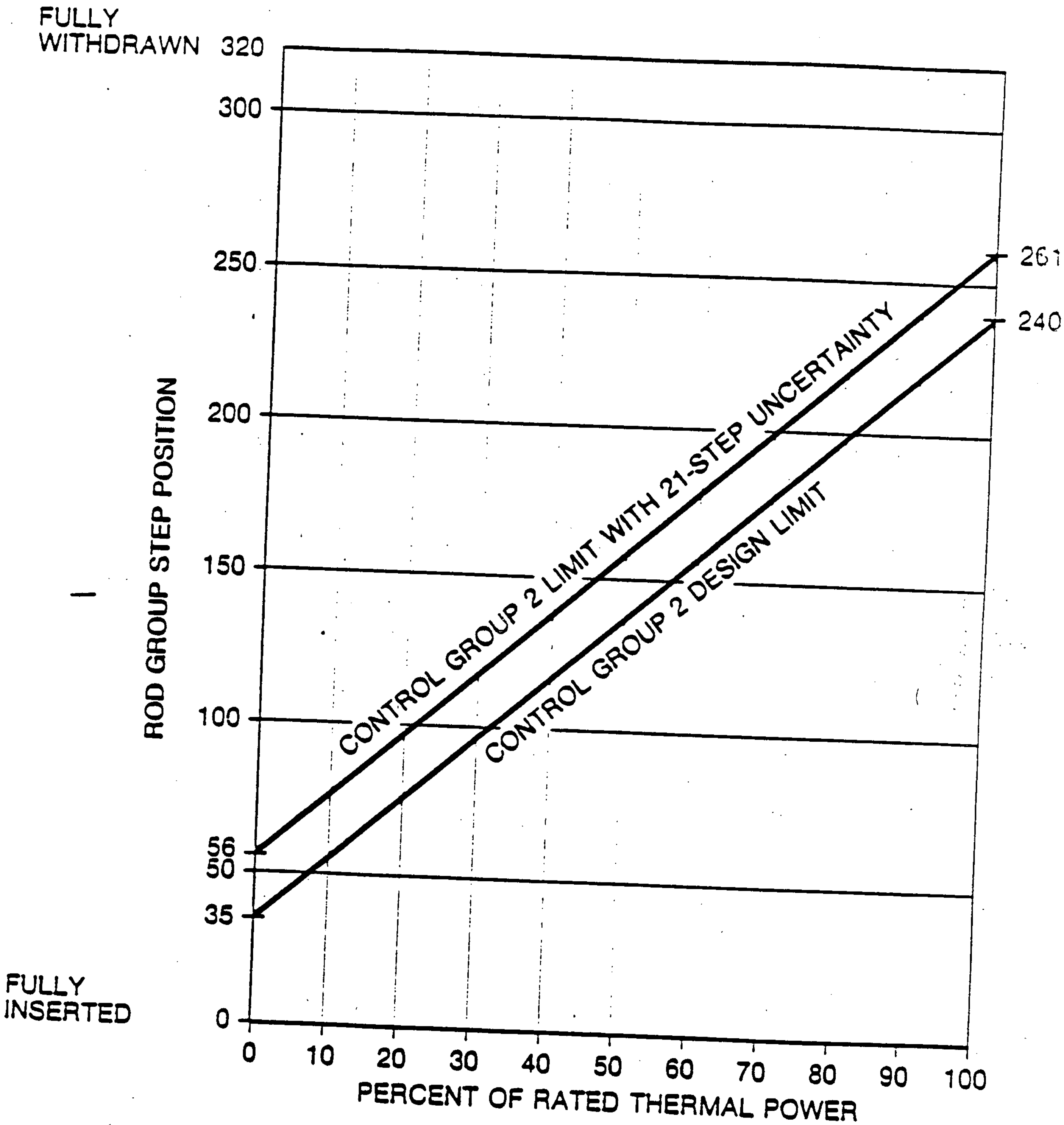

FIGURE 3.5.2.1